

What is claimed is:

1. A method of producing a micro-electromechanical element
5 comprising the following steps:

a) structuring a first intermediate layer, which is applied to a first main surface of a first semiconductor wafer, so as to produce a recess;

10 b) connecting the first semiconductor wafer via the first intermediate layer to a second semiconductor wafer in such a way that a hermetically sealed cavity is defined by the recess;

15 c) thinning one of the wafers from a surface facing away from said first intermediate layer so as to produce a diaphragm-like structure on top of the cavity;

20 d) producing electronic components in said thinned semiconductor wafer;

25 e) providing at least one further intermediate layer between the two semiconductor wafers, which, prior to the connection of the two semiconductor wafers, is structured, in such a way that the structure formed in said at least one further intermediate layer and the recess in said first intermediate layer define the cavity; and

30 f) producing at least one defined opening so as to provide access to the hermetically sealed cavity.

2. A method according to claim 1, wherein the main surface of the second semiconductor wafer, which is connected to the first semiconductor wafer via the intermediate layer, has applied thereto a second intermediate layer prior to the connecting step.
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3. A method according to claim 2, wherein the second intermediate layer is structured in such a way that, after the connecting step, the structure formed in the second intermediate layer and the recess in the first intermediate layer define the cavity.
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4. A method according to claim 1, wherein a cavity with areas of variable height is produced due to the use of a plurality of intermediate layers.
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5. A method according to claim 1, wherein the first and the second wafer consist of silicon.
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6. A method according to claim 1, wherein said plurality of intermediate layers consist of an oxide, a polysilicon, a nitride or of metal.
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7. A method according to claim 1, wherein said intermediate layers are structured in such a way that, after the connection of the two wafers, a plurality of cavities is defined, said cavities being interconnected by channels and hermetically sealed from their surroundings.
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8. A method according to claim 1, wherein the connection in step b) is carried out in a vacuum.

9. A method according to claim 1, wherein an SOI wafer is used as a first and/or second wafer.
10. A method according to claim 1, wherein said at least one defined opening is produced in the diaphragm-like structure.
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11. A method according to claim 10, wherein said at least one defined opening is produced in the diaphragm-like structure by means of a needle, a blade, by the use of a pulsed laser radiation or by etching.
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12. A method according to claim 7, wherein the channel is structured in the fashion of a labyrinth in step a) in such a way that disturbing products formed during the production of the opening are prevented from passing said channel.
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13. A method of producing a micro-electromechanical element comprising the following steps:
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- a) structuring a first intermediate layer, which is applied to a first main surface of a first semiconductor wafer, so as to produce a recess;
- 25 b) connecting the first semiconductor wafer via the first intermediate layer to a second semiconductor wafer in such a way that a hermetically sealed cavity is defined by the recess;
- c) thinning one of the wafers from a surface facing away from said first intermediate layer so as to
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produce a diaphragm-like structure on top of the cavity;

5 d) producing electronic components in said thinned semiconductor wafer; and

10 e) dicing a plurality of micro-electromechanical structures, which are formed in a wafer according to steps a) to d), so as to obtain chips, a defined opening, which provides access to the hermetically sealed cavities, being produced by the dicing step.

14. A method according to claim 13, wherein the main surface of the second semiconductor wafer, which is connected to the first semiconductor wafer via the intermediate layer, has applied thereto a second intermediate layer prior to the connecting step.

15. A method according to claim 14, wherein the second intermediate layer is structured in such a way that, after the connecting step, the structure formed in the second intermediate layer and the recess in the first intermediate layer define the cavity.

25 16. A method according to claim 13, wherein a cavity with areas of variable height is produced due to the use of a plurality of intermediate layers.

30 17. A method according to claim 13, wherein the first and the second wafer consist of silicon.

18. A method according to claim 13, wherein said intermediate layer consist of an oxide, a polysilicon, a nitride or of metal.

5 19. A method according to claim 13, wherein said intermediate layers are structured in such a way that, after the connection of the two wafers, a plurality of cavities is defined, said cavities being interconnected by channels and hermetically sealed from their surroundings.

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20. A method according to claim 13, wherein the connection in step b) is carried out in a vacuum.

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21. A method according to claim 13, wherein an SOI wafer is used as a first and/or second wafer.

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22. A method according to claim 19, wherein the channel is structured in the fashion of a labyrinth in step a) in such a way that disturbing products formed during the production of the opening are prevented from passing said channel.

23. A method of producing a micro-electromechanical element comprising the following steps:

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a) structuring a first intermediate layer, which is applied to a first main surface of a first semiconductor wafer, so as to produce a recess;

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b) connecting the first semiconductor wafer via the first intermediate layer to a second semiconductor wafer in such a way that a hermetically sealed cavity is defined by the recess;

5 c) thinning one of the wafers from a surface facing away from said first intermediate layer so as to produce a diaphragm-like structure on top of the cavity;

10 d) producing electronic components in said thinned semiconductor wafer;

15 wherein in step a) the intermediate layer is structured in such a way that, when the two wafers have been connected, at least two hermetically sealed cavities are defined, which are interconnected by a channel, a respective diaphragm-like structure being arranged on top of each of said cavities after step c),

20 and wherein the method additionally comprises the step e) of opening a defined opening through the diaphragm-like structure on top of one of the cavities.

25 24. A method according to claim 23, wherein the main surface of the second semiconductor wafer, which is connected to the first semiconductor wafer via the intermediate layer, has applied thereto a second intermediate layer prior to the connecting step.

30 25. A method according to claim 24, wherein the second intermediate layer is structured in such a way that, after the connecting step, the structure formed in the second intermediate layer and the recess in the first intermediate layer define the cavity.

26. A method according to claim 23, wherein a cavity with areas of variable height is produced due to the use of a plurality of intermediate layers.

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27. A method according to claim 23, wherein the first and the second wafer consist of silicon.

10 28. A method according to claim 23, wherein said intermediate layer consists of an oxide, a polysilicon, a nitride or of metal.

29. A method according to claim 23, wherein the connection in step b) is carried out in a vacuum.

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30. A method according to claim 23, wherein an SOI wafer is used as a first and/or second wafer.

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31. A method according to claim 23, wherein said at least one defined opening is produced in the diaphragm-like structure by means of a needle, a blade, by the use of a pulsed laser radiation or by etching.

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32. A method according to claim 23, wherein the channel is structured in the fashion of a labyrinth in step a) in such a way that disturbing products formed during the production of the opening are prevented from passing said channel.

30 33. A method of producing a micro-electromechanical element comprising the following steps:

- a) structuring a first intermediate layer, which is applied to a first main surface of a first semiconductor wafer, so as to produce a recess;
- 5 b) connecting the first semiconductor wafer via the first intermediate layer to a second semiconductor wafer in such a way that a hermetically sealed cavity is defined by the recess;
- 10 c) thinning one of the wafers from a surface facing away from said first intermediate layer so as to produce a diaphragm-like structure on top of the cavity;
- 15 d) producing electronic components in said thinned semiconductor wafer; and
- e) producing a plurality of defined openings in the diaphragm-like structure in such a way that, when said openings have been produced, the diaphragm-like structure forms a supporting structure for the movable mass of an acceleration sensor.

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34. A method according to claim 33, wherein the main surface of the second semiconductor wafer, which is connected to the first semiconductor wafer via the intermediate layer, has applied thereto a second intermediate layer prior to the connecting step.
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- 30 35. A method according to claim 34, wherein the second intermediate layer is structured in such a way that, after the connecting step, the structure formed in the second

intermediate layer and the recess in the first intermediate layer define the cavity.

36. A method according to claim 33, wherein a cavity with
5 areas of variable height is produced due to the use of a plurality of intermediate layers.

37. A method according to claim 33, wherein the first and
10 the second wafer consist of silicon.

38. A method according to claim 33, wherein said intermediate layer consists of an oxide, a polysilicon, a nitride or of metal.

15 39. A method according to claim 33, wherein the connection in step b) is carried out in a vacuum.

40. A method according to claim 33, wherein an SOI wafer is used as a first and/or second wafer.

20 41. A method according to claim 33, wherein said openings are produced in the diaphragm-like structure by means of a needle, a blade, by the use of a pulsed laser radiation or by etching.

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